Stereotactic Radiosurgery for Brain Metastases in Palestine: First Nationwide Study in a Resource-Limited Setting

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Background

Stereotactic radiosurgery (SRS) is increasingly used for the management of brain metastases, yet regional data from the Middle East are limited. Augusta Victoria Hospital (AVH) in East Jerusalem is the sole cancer center in Palestine for radiation therapy, serving as the national referral site for SRS. This study reports the first Palestinian experience, evaluating patient characteristics, treatment outcomes, local progression-free survival (LPFS), overall survival (OS), and prognostic factors in a resource-limited healthcare setting.

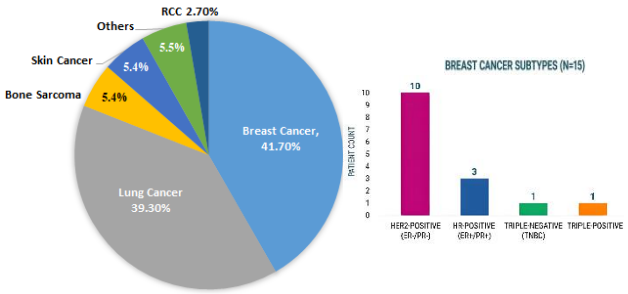

Figure 1. Primary tumor distribution among patients treated with stereotactic radiosurgery (SRS).

Methods

Thirty-six patients with 51 brain metastases were treated with single-fraction SRS (20 Gy) between April 2019 and August 2024. Dose prescription followed two approaches: 20 Gy to the 80% isodose line (Dmax = 25 Gy) or 20 Gy defined as D98 with D0.03 cc = 24–25 Gy. Kaplan–Meier survival analysis and Cox proportional hazards models estimated LPFS and OS. Variables analyzed included age, Karnofsky Performance Status (KPS), recursive partitioning analysis (RPA) class, diagnosis-specific graded prognostic assessment (GPA), gross tumor volume (GTV), and histology.

Results

Breast cancer was the most common primary tumor (41.7%), followed by NSCLC adenocarcinoma (30.6%), with 91.6% of lesions located supratentorially. Median GTV was 1.65 cm³ (IQR, 1.0–2.0). LPFS at 12 and 24 months was 96% and 87%, respectively. OS at 1, 2, and 3 years was 100%, 95%, and 80%. On initial follow-up MRI, 61.1% of lesions demonstrated partial or complete response, 36.1% remained stable, and 2.8% progressed.

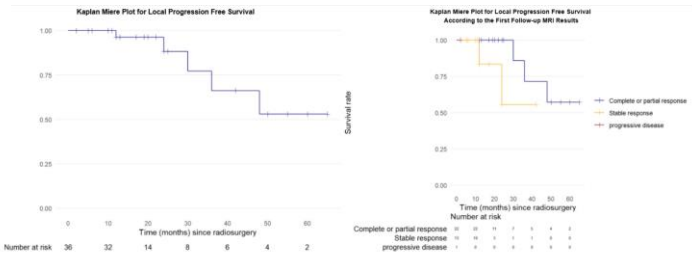

Figure 2. Kaplan–Meier curve for overall survival (OS) following stereotactic radiosurgery.

Multivariate analysis revealed no significant association between OS and GTV (HR = 0.18; p = 0.31) or histology (HR = 1.18; p = 0.92), while RPA class showed a trend toward prognostic relevance (HR = 0.03; p = 0.09). LPFS was not significantly influenced by age, KPS, or tumor volume. Median follow-up was 32 months.

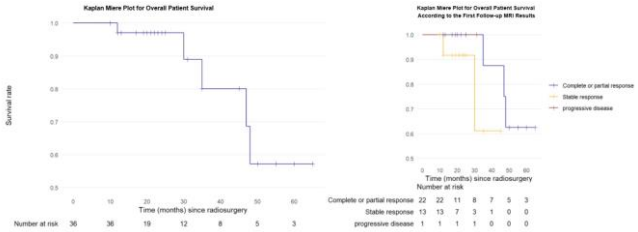

Figure 3. Kaplan–Meier curve for Local progression free survival (LPFS) following stereotactic radiosurgery.

Conclusion

This first national experience demonstrates that high-quality stereotactic radiosurgery for brain metastases is feasible and effective within a resource-limited setting, achieving outcomes comparable to international standards.

Acknowledgments

We thank the multidisciplinary teams across Palestine for enabling this nationwide stereotactic radiosurgery study.

References

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